

Claims 1-2, 5 and 7-8 are rejected under 35 U.S.C. § 102(e) for lack of novelty as evidenced by Nagao et al., U.S. Patent No. 6,252,758 (hereinafter Nagao)

In the second enumerated paragraph of the Office Action, the Examiner asserted that Nagao discloses an electrostatic chucking system corresponding to that claimed. This rejection is respectfully traversed.

Initially, Applicant notes that claim 1 has been cancelled, and claims 2, 5 and 7-8 have been amended to depend from independent claim 6. As the Examiner failed to indicate that claim 6 was rejected in the Office Action, Applicant can only assume that the Examiner considered claim 6 allowable over the applied prior art. Thus, claims 2, 5 and 7-8 are also allowable over the applied prior art at least on the basis of their dependency upon claim 6. Therefore, Applicant respectfully request the withdrawal of the rejection of claims 2, 5 and 7-8 for lack of novelty under 35 U.S.C. § 102 as evidenced by Nagao.

Although the Examiner has not rejected claim 6 on any basis, should the Examiner be inclined to reject claim 6 by arguing that parameters as to shape, size, dimension, thickness, etc. would be obvious as a matter of design choice, such as the claimed rate of temperature change, Applicant would refer the Examiner to M.P.E.P. § 2144.05 II(B), which is entitled "***Only Result-Effective Variables Can Be Optimized.***" As recognized by the courts, the Examiner must first establish that the parameter to be modified is an art-recognized, result effective, variable. See, **In re Rijckaert**, 9 F.3d 1531, 28 USPQ2d 1955 (Fed. Cir. 1993); **In re Yates**, 663 F.2d 1054, 211 USPQ 1149 (CCPA 1981); **In re Antonie**, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). As such, prior to asserting that the limitations as to the claimed rate of temperature change would

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have been obvious, the Examiner must first establish that the parameter is: (1) variable, (2) result effective, and (3) art-recognized.

As part (1) implies, the parameter must be variable. As such, the disclosure of a value or range of the parameter does not establish that the parameter is variable. There must be some teaching that the parameter can vary (i.e., variable) from the disclosed value or range. Furthermore, as to part (2), the Examiner must establish that the prior art gives one having ordinary skill in the art a reason to optimize this parameter (i.e., varying the limitations produces a desirable result). In this regard, the Examiner must go beyond establishing that varying the parameter produces some random result. A random result is not enough; instead, the result must be desirable, and thus, the parameter is thereby worth modifying by one having ordinary skill in the art. Finally, with regard to part (3), all of the above requirements must be art-recognized. As such, it is insufficient for an Examiner to assert, without any support by the applied prior art, that a particular parameter is an art-recognized, result effective variable.

Neither Nagao nor the other applied references of Hunter and Hoinkis establish that the rate of temperature change of a semiconductor substrate during chucking is an art-recognized, result effective variable. As such, the Examiner cannot assert that optimizing this parameter would have been obvious to one having ordinary skill in the art.

Claim 3 is rejected under 35 U.S.C. § 103 for obviousness predicated upon Nagao in view of Hoinkis et al., U.S. Patent No. 5,872,694 (hereinafter Hoinkis)

In the fourth enumerated paragraph of the Office Action, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the electrostatic chucking system of Nagao in view of Hoinkis to arrive at the claimed invention. This rejection is respectfully traversed.

Applicant respectfully submits that the Examiner has failed to discharge the initial burden of establishing a prima facie basis to deny patentability to the claimed invention under 35 U.S.C. § 103. **In re Mayne**, 104 F.3d 1339, 41 USPQ2d 1451 (Fed. Cir. 1997); **In re Oetiker**, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992).¹ In particular, the Examiner has failed to provide any motivation to replace the temperature sensor of Nagao with the warpage measurement tool 20 of Hoinkis.²

As discussed in column 3, line 49 to column 4, line 2 of Hoinkis, the warpage measurement tool 20 measures the warpage prior to processing of a wafer 14 on the electrostatic chuck. This data is then used by an electrostatic chuck software control 18 to determine a value of a minimum clamping voltage 19 in a memory 19. This minimum clamping voltage is then applied by the electrostatic chuck voltage supply 16 during subsequent processing of the wafer 14. Thus, the warpage is measure prior to processing. In contrast, in column 5, lines 41-48,

¹ In rejecting a claim under 35 U.S.C. § 103, the Examiner is required to identify a source in the applied prior art for: (1) claim limitations; and (2) the motivation to combine references or modify a reference in the reasonable expectation of achieving a particular benefit. **Smiths Industries Medical System v. Vital Signs Inc.**, 183 F.3d 1347, 51 USPQ2d 1415 (Fed. Cir. 1999).

² The requisite motivation to support the ultimate legal conclusion of obviousness under 35 U.S.C. § 103 is not an abstract concept, but must stem from the applied prior art as a whole and have realistically impelled one having ordinary skill in the art to combine specific references to arrive at a specifically claimed invention. **In re Deuel**, 51 F.3d 1552, 34 USPQ2d 1210 (Fed. Cir. 1995); **In re Newell**, 891 F.2d 899, 13 USPQ2d 1248 (Fed. Cir. 1989). The mere identification of claim features in disparate references does not establish the requisite realistic motivation to support the ultimate legal conclusion of obviousness under 35 U.S.C. § 103. **Grain Processing Corp. v. American-Maize Products Co.**, 840 F.2d 902, 5 USPQ2d 1788 (Fed. Cir. 1988). Moreover, a generalization does not establish the

Nagao discloses that the temperature of an electrostatic chuck 14 is monitored by a thermocouple 11, and real-time data is used by the controller to determine the applied voltage. As such, why would one having ordinary skill art have been led to replace the real-time thermocouple of Nagao with the warpage measurement tool of Hoinkis that only measures warpage a single time prior to the semiconductor wafer being chucked? To do so would change how the device of Hoinkis operates by eliminating the ability of Hoinkis to use real-time data to control voltage to the electrostatic chuck and thereby the temperature of the semiconductor wafer. Furthermore, Nagao wants to measure temperature, not warpage. In this regard, it is well settled by the Courts that one having ordinary skill in the art cannot be considered realistically motivated to modify a reference inconsistent with the disclosed objective of the reference (i.e., to provide real-time temperature data to a controller for use in determining applied voltage to an electrostatic chuck). **In re Fritch**, 972 F.2d 1260, 23 USPQ2d 1780 (Fed. Cir. 1992); **In re Gordon**, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984); **In re Schulpen**, 390 F.2d 1009, 157 USPQ 52 (CCPA 1968).

Applicant would further note that Hoinkis does not advocate using the warpage measuring tool 20 to supply a signal unit for controlling step-wise the applied voltage sent to an electrostatic chuck. Hoinkis merely teaches that a single piece of data (i.e., a minimum clamping voltage) is derived from the warpage measuring tool 20. A single piece of data, however, has not been established as sufficient to control step-wise the applied voltage sent to an electrostatic chuck. As such, one having ordinary skill in the art would not have been motivated to modify Nagao in view of Hoinkis so as to arrive at the claimed invention in the manner suggested by the

requisite motivation to modify a specific reference in a specific manner to arrive at a specifically claimed invention. **In re Deuel**, supra.

Examiner. Thus, Applicant respectfully solicits the withdrawal of the imposed rejection of claim 3 under 35 U.S.C. § 103 for obviousness predicated upon Nagao in view of Hoinkis.

Claim 4 is rejected under 35 U.S.C. § 103 for obviousness predicated upon Nagao in view of Hunter, U.S. Patent No. 6,244,121

In the fifth enumerated paragraph of the Office Action, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the electrostatic chucking system of Nagao in view of Hunter to arrive at the claimed invention. This rejection is respectfully traversed.

Applicant submits that the Examiner has not established a prima facie basis to deny patentability to the claimed invention under 35 U.S.C. § 103 for lack of the requisite factual basis and lack of the requisite realistic motivation. Notwithstanding that Hunter discloses a "distance probe," the Examiner has failed to establish that the distance probe sends signals to a voltage control section to control an applied voltage to an electrostatic chuck. The Examiner cites column 9, lines 60-62 for such a disclosure, and this citation is reproduced below:

Another active probe is a distance problem which can ensure that the wafer surface is both parallel to and at the proper distance from the target or shower head of the process chamber.

A review of this citation, however, yields no teaching that the probe sends data to a voltage control section for controlling an applied voltage. Furthermore, since Hunter fails to disclose a distance probe that sends data to a voltage control section, the probe of Hunter, therefore, cannot send data that controls step-wise an applied voltage sent to the electrostatic chuck. Thus, there is no factual basis upon which to support even a prima facie case of obviousness under 35 U.S.C. § 103. **In re Freed**, 425 F.2d 785, 165 USPQ 570 (CCPA 1970).

Not only has the Examiner failed to establish that Hunter discloses the claimed distance sensor recited in claim 4, the Examiner's proposed motivation of "the distance sensor is more cost efficient" is legally insufficient. The Examiner has merely copied, almost verbatim, certain benefits of Hunter without ever relating these benefits to the teachings of Nagao. For example, how are the "cost benefits" of the distance probe described in Hunter calculated and to what in Nagao is the distance probe being compared? If the distance probe of Hunter is not being compared to the temperature sensor of Nagao, why would the Examiner's proposed motivational element of "more cost efficient" motivate one having ordinary skill in the art to replace the temperature sensor of Nagao with the distance probe of Hunter? Furthermore, replacing the temperature sensor of Nagao with the distance probe of Hunter is inconsistent with Nagao's disclosed objective of providing real-time temperature data to a controller for use in determining applied voltage to an electrostatic chuck. As such, one having ordinary skill in the art would not have been motivated to modify Nagao in view of Hunter so as to arrive at the claimed invention in the manner suggested by the Examiner. Thus, Applicant respectfully solicits the withdrawal of the imposed rejection of claim 4 under 35 U.S.C. § 103 for obviousness predicated upon Nagao in view of Hunter.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "Version with markings to show changes made."

Applicant has made every effort to present claims which distinguish over the prior art, and it is believed that all claims are in condition for allowance. However, Applicant invites the Examiner to call the undersigned if it is believed that a telephonic interview would expedite the

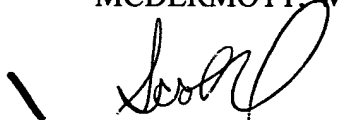
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prosecution of the application to an allowance. Accordingly, and in view of the foregoing remarks, Applicant hereby respectfully requests reconsideration and prompt allowance of the pending claims.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417, and please credit any excess fees to such deposit account.

Respectfully submitted,

MCDERMOTT WILL & EMERY

A handwritten signature in black ink, appearing to read "Scott D. Paul", is written over the printed name. To the left of the signature is a small, dark, handwritten mark resembling a checkmark or a stylized "V".

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Version with markings to show changes made

IN THE CLAIMS:

Please cancel claim 1 in its entirety without prejudice or disclaimer of the subject matter and amend claims 2-8 as follows:

2. (Amended) The electrostatic chucking system according to claim [1] 6, further comprising a temperature sensor for detecting the temperature of the semiconductor substrate held by said electrostatic chuck, wherein a signal output from said temperature sensor is input to said voltage control section to thereby control the applied voltage.

3. (Amended) An [The] electrostatic chucking system [according to claim 1] comprising:
an electrostatic chuck having an electrode for chucking a semiconductor substrate;
a power supply section for applying a voltage to said electrode;
a voltage control section for controlling the applied voltage; and [further comprising]
a warpage sensor for detecting the amount of warpage arising in the semiconductor substrate held by said electrostatic chuck, wherein a signal output from said warpage sensor is input to said voltage control section to thereby control the applied voltage, wherein
said voltage control section varies and controls the applied voltage stepwise based upon
said signal output from said warpage sensor,

4. (Amended) An [The] electrostatic chucking system [according to claim 1] comprising:
an electrostatic chuck having an electrode for chucking a semiconductor substrate;

a power supply section for applying a voltage to said electrode;

a voltage control section for controlling the applied voltage; and [further comprising]

a distance sensor for detecting the distance between said electrostatic chuck and the semiconductor substrate held by said electrostatic chuck, wherein a signal output from said distance sensor is input to said voltage control section to thereby control the applied voltage, wherein

said voltage control section varies and controls the applied voltage stepwise based upon said signal output from said distance sensor,

5. (Amended) The electrostatic chucking system according to claim [1] 6, wherein the control of variation in the applied voltage involves either increase or decrease in voltage.

6. (Amended) An [The] electrostatic chucking system [according to claim 1,] comprising:

an electrostatic chuck having an electrode for chucking a semiconductor substrate;

a power supply section for applying a voltage to said electrode; and

a voltage control section for controlling the applied voltage, wherein

said voltage control section varies and controls the applied voltage stepwise, and wherein

the applied voltage is controlled such that a rate at which the temperature change of [a] the semiconductor substrate falls with [the] a range of 10°C/sec. to 150°C/sec.

7. (Amended) A method of manufacturing a semiconductor device comprising a step of treating a semiconductor wafer through use of the electrostatic system according to claim [1] 6.

8. (Amended) An apparatus for manufacturing a semiconductor device, said apparatus comprising the electrostatic system according to claim [1] 6.